

# "the packet"

The newsletter of V.A.D.C.G.

The Vancouver Amateur Digital Communications Group

#7  
SEPT. 1982

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Vancouver Amateur Digital Communications Group

818 Rondeau Street, Coquitlam, British Columbia, Canada V3J5Z3

# MEETING

\*\*\*\*\*  
\* There will be a public meeting of the VADCG on Wednesday, \*  
\* September 15, 1982, at the Trout Lake Community centre, \*  
\* 3350 Victoria Drive, Vancouver, B. C. (We will be \*  
\* monitoring 146.52 and VE7RBY, 144.75in/145.35out, if you \*  
\* need directions.) \*  
\*\*\*\*\*

## TIP AND LIP EPROMS

Since the publishing of THE PACKET Number 6, improvements have been made to the TIP and LIP programs. The LIP still only requires two EPROMS. The TIP however, has grown to two EPROMS. This brings the total EPROM count to four.

The VADCG will no longer support the three EPROM set for the TNC but for a limited time will burn your 3 EPROM set as follows:

- 1) Send your 3 EPROMS and \$10  
OR 2) Send 4 EPROMS and \$5

AND 3) Terminal configuration and Callsign for programming into EPROMS.

and we will return a set of 4 programmed EPROMS.

## TAPR AND SLAPR

Two new groups have joined the ranks of packet radio. These are the Tucson Area Packet Radio and St. Louis Area Packet Radio groups. While these groups are developing their own hardware, they have indicated that their protocol will be compatible with ours. Best of luck is extended to them and we're hoping for the day when our two networks can communicate.

## DIRECT CBBS GATEWAY

What could be better than a telephone gateway into a CBBS? A direct connection of course. A suggestion has been made by some of the people involved with a local BBS to connect a TNC to their system. Needless to say we are very interested and are examining just how to go about doing it. It is hoped you will be able to hear the good news soon on the air.

# PROGRESS

## VHF RTTY GATEWAY

The hardware required to begin experiments with a RTTY gateway have been gathered together. Richard Chycoski, VE7CVS, is working on assembling and debugging the hardware as well as necessary TIP modifications to allow proper operation.

While expected date of completion seems to change by the phase of the moon etcetera, it is reasonable to expect an experimental gateway could be ready by the end of September. The experimental gateway will be located at Richard's until debugged. After it has been debugged it will be placed in a better permanent location, possibly the site of the VHF RTTY repeater (VE7RTY).

## TELEPHONE GATEWAY

A telephone gateway to allow access of the twisted pair from the packet radio network was proposed at the last VADCG working meeting. With the proliferation of Computer Bulletin Board Systems (CBBS's), who could NOT like the idea??? Several members have tentatively volunteered to work on this project, and plans are being made as to who will do what. If you've been "itching" to try to design an autodialer and would like to help, contact Dale McGladdery, VE7 at the next VADCG meeting.

An HF packet radio modem has been designed and built by Bob Livingston, W1CYB. The modem uses an interesting digital filter, which in experiments has proven to be very sharp.

As always the largest area of work lies in the software. Bob obtained the use of an Apple (thanks to Dennis, VE7CXN) for a period of time to do development work. Unfortunately, being such a new area, there is little ground work to go by. At the present time Bob is experimenting with self-correcting error codes, as well as the whole aspect of what an HF packet protocol should contain. Bob should have plenty of stuff for articles based on his implementation and theories, when (if) he decides on the PERFECT code.

Jim Pake, VE7ACY, is working on the more conventional side of the HF gateway, the Collins radio. Due to an unavailability of silver mica capacitors his work was stalled for a while. A source has since been found and work is proceeding once again. Jim is now working at rewinding the coils for operation on the amateur band. This will explain any strange noises coming from his QTH!!!

#### STATION NODE - HARDWARE

Peter Wishart and Fred Richards, VE7FIT have pulled out all stops in debugging the VADCG's S100 system. Quite a number of solder bridges were found and removed, leaving only the infamous "FINAL PROBLEM". In spite of replacing almost every chip and driver being removed, bus conflicts are occurring on the CPU board. When this final problem is debugged (and the party thereafter finished) the S100 test node can be experimented with.

#### STATION NODE - SOFTWARE

Doug Lockhart's software development has been long stalled by the lack of a working hardware prototype. Many different efforts have been made to begin verification of his code. In conjunction with the recent success with the Vancouver hardware, Doug has bought another S100 mainframe (#3) to do his development in Toronto.

#### COMING UP

##### TNC's

This article will detail some of the methods used by members of the VADCG in constructing their Terminal Node Controllers. Three TNC's, covering the spectrum of simple to more elaborate will be covered, with discussions of the various pros and cons of each design.

##### TIP LISTING

Yes, the new improved TIP listing will finally become available, as well as documentation for it. This has been a long time coming and unfortunately was not ready for this issue. (Let he who has never has never had S100 problems throw the first stone!!!!) But by the next issue, all system bugs should be worked out and a listing printed. To waiting it will be mailed immediately upon debugging.

##### RTTY GATEWAY

It's hoped that by the next newsletter some testing will have been done on the RTTY VHF gateway. Hopefully enough some news, hints or maybe a even full blown article (don't hold your breath on the last one) can be written.

##### MODEM MOD

It happens to the best of equipment, and the VADCG radio modem is no exception. The next packet will contain a mod to change the VADCG modem from a Bell 202 standard to a teletype standard. If you've got nothing to do, see if you can do the mod yourself and we can compare notes in the next newsletter.

##### MY THANKS

Being new at anything is never easy and this newsletter is no exception. I can see why Don was so bogged down. For what it's worth this is my first attempt and I hope you as a reader get something worthwhile out of it. I sure as hell ain't getting paid for this.

As newsletter compiler (with my spelling I'll never make editor!) I would like to thank Richard Chycoski, VE7CVS, and John Spraggs, VE7ADE for all their time, help and especially patience. They have definitely made it a better newsletter.

Who am I you're wondering. Sorry, CRC error! Only kidding

*Dale H. Haddock*  
VE7ENG



# AMRAD

## Amateur Radio Research and Development Corporation

Dear Readers of The Packet,

Greetings from AMRAD, a group of over 500 Amateur Radio and personal computer experimenters. For well over two years now, packet radio has been our most active project. We have been in close touch with VADCG, other packet groups and the American Radio Relay League to cooperate on the development of packet radio.

Our monthly AMRAD Newsletter is largely devoted to packet radio. We have a regular "Protocol" column authored by Dave Borden, K8MMO since February 1980. In addition, there have been a number of other articles about packet radio nearly every month. We recently concluded a series of articles by Jerome Dijak, W9JD on hf tests of the W9JD forward-error-control (FEC) automatic-request (ARQ) system. To get future copies of the newsletter, please fill in the application printed below and include the required dues. Back issues of the newsletter are available at the cost of US\$1.00 per issue from AMRAD, 1524 Springvale Ave, McLean, VA USA 22101; a sheet listing back issues and their contents is also available for the asking. We also invite articles on packet radio from prospective authors.

We have depleted our stock of printed proceedings of the "ARRL Amateur Radio Computer Networking Conference," both volumes 1 and 2. If you didn't get a copy, we can send you a complete photocopy at US\$8.00 to cover reproduction and mailing.

73, Paul L. Rinaldo, W4RI

# AMRAD

## Amateur Radio Research and Development Corporation

### Membership Application/Renewal

Mail to: Dr. William P. Pala, WB4NFB  
5829 Parakeet Drive  
Burke, VA 22015

See reverse for  
overseas mailing  
rates.

	Annual	Life
Dues: Regular	\$15	\$180
2nd in family same adr	8	96
Full-time student	5	-

Please make checks payable to AMRAD.

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Call \_\_\_\_\_ Phone( ) \_\_\_\_\_

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City, \_\_\_\_\_  
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I agree to support the purposes of the Corporation.

Class License \_\_\_\_\_ ☐ ARRL Member  
Interests:  
☐ Packet Radio ☐ Spread Spectrum  
☐ DRTTY ☐ Deaf TTY  
Computer model \_\_\_\_\_  
Microprocessor type \_\_\_\_\_

Signature \_\_\_\_\_

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TERRY WHITTAM		VE3MVR	M1B 3H7
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KEITH WITNEY		VE3MVR	M3B 1W8
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RUSSELL MILLAND		VE3MVR	M9A 1Z4
LARRY S. ALLEN		VE3MVR	M9M 1C5
T.K. MURPHY		VE3MVR	N1A 2R1
CLAYT ANGUISH		VE3MVR	N3S 3T1
JOHN MACMILLAN		VE3MVR	R0E 1L0
ARCHIE R.N. SMITH		VE3MVR	R2L 1V4
BORIS LAVRINOFF		VE3MVR	S4T 4V7
MARTIN GUTHRIE		VE3MVR	S6J 3C2
CALGARY A.R.A.		VE3MVR	T2H 1C7
WALTER IBACSON		VE3MVR	T2T 0R8
R. ROSS CARR		VE3MVR	T2M 0T8
JOHN BLOMMERS		VE3MVR	T5X 3B5
KEITH TUTTON		VE3MVR	T6E 2A0
CYRIL KNUDSON		VE3MVR	V---
CHRIS HAMMERSTEIN		VE3MVR	V0M 1B0
AL KOPPEL		VE3MVR	V0S 1A0
MILTON R. RUFF		VE3MVR	V0S 1E0
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WALLY REID		VE3MVR	V1M 1C7
ORIN REEBE		VE3MVR	V2A 6R4
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VE7CDB



# AMTOR

AMTOR is a name that amateurs are using to describe amateur use of a commercial system known as SITOR. It is a form of packet switching that has been specifically designed to overcome problems associated with transmitting data over HF. The ARRL is presently petitioning the FCC to make law changes that would allow the use of AMTOR by American amateurs.

When transmitting data using AMTOR, data is sent in blocks of three. After each block of three, the transmitting station listens for either an acknowledgement or instruction to retransmit the block. In absence of either of these instructions the station continues retransmitting the block until an acknowledgement is heard. Due to this constant turnaround (about 20 milliseconds), AMTOR transmissions are said to make a very characteristic "chirping" sound.

At the present time amateurs in the United Kingdom, West Germany, and Australia are permitted to use AMTOR. A small group of American amateurs have, under special permit, also been allowed the use of AMTOR. It appears most activity is on 14.075 MHz (mark) 14.07483 MHz (space). Amateurs using AMTOR are very happy with its improvement over standard teletype, especially in adverse conditions such as fading. However, speeds are still only in the area of 100 bps area.

While there is experimentation going on in Canada with different types of HF protocols, it is not known to the author if any experimentation is being carried out with AMTOR.

## SORTED VADCG LIST BY POSTAL CODE

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DON CARTER	VE7COD	N. VANCOUVER B.C.	V7N 2T9
BRIAN MCINTOSH		N. VANCOUVER B.C.	V7N 3V7
DAVE ERIKS	VE7BPD	N. VANCOUVER B.C.	V7R 1M1
GORDON SYLVESTER	VE7CZ2	WEST VANCOUVER B.C.	V7T 2K1
JAN PUNNETT		VICTORIA B.C.	V8B 3V1
KELLY JORDAN	VE7BRU	PRINCE RUPERT B.C.	V8J 4B5
W.R. (RONALD) CONWAY		VICTORIA B.C.	V8R 6A2
ERNIE CREAGER	VE7AXQ	VICTORIA B.C.	V8Y 2B9
DANIEL PICHE	VE7BOL	COLWOOD B.C.	V9C 2N6
FRED MCLENNAN	VE7DEP	DUNCAN B.C.	V9L 1P8
ALEX RUSSELL	VE7AWT	DUNCAN B.C.	V9L 3B8
MARTIN W. DUNSMUIR	VE7BDF	DUNCAN B.C.	V9L 3X5
BRICE WHITTLES	VE7DJC	NANAIMO B.C.	V9T 1J5
STEWART MUNRO	VE6CH	HAY RIVER NMT	XOE ORO

## PACKETS FROM DOWN UNDER

Jim Swetlikoe (a VK2) has expressed interest in packet radio and VADCG's TNC board. He is planning to start an Australian packet network with VADCG hardware. The idea of a world wide packet radio network may seem far off but it's definitely coming.

## CALGARY GROUP

A group of RTTY enthusiasts in the Calgary Amateur Club have been looking at a VADCG system for a while now and hope to transfer their public services and emerging network communications to this format. Since this is a natural application and will garner lots of good publicity for us. It will be very interesting to watch their progress.

## VADCG RADIO MODEM

The radio modem is a device that takes the bit oriented binary data and converts it into tones which represent the binary states, and vice versa. The VADCG built the modem to provide a product that was not available (at a reasonable price) on the consumer market.

This article will discuss an overview of the VADCG radio modem circuit, for those of the readership who are thinking of designing their own modem, or are curious about what the VADCG radio modem actually does.

The EXAR XR2206 function generator and EXAR XR2211 phased-lock loop FSK detector are the heart of the circuit. This IC pair was chosen because they were specifically designed for such applications, and as such greatly simplify design and lower the total chip count.

The XR2211 demodulator accepts an audio signal from the receiver (in the case of a packet radio system) and converts it into two discrete voltage levels representing binary zero and one. The frequencies used are those of the Bell 202 modem standard. (The modem is optimized for radio use, however, and also does not include circuitry for telephone connection.) The resistors and capacitors set the tone frequencies. This IC also produces a Carrier Detect signal (DCD), telling the TNC (via the RS232 interface) that a signal is present. It also drives a LED that can be mounted on the front panel. This can be useful in troubleshooting and also looks good! The data output from the IC is fed into an op amp to make the receive data line (Rx Data) RS232 compatible. That is, it converts the XR2211 logic levels to plus or minus 12 volts.

The modem transmit section is a little more complicated. The XR2206 is used to convert the binary data into audio tones. The resistors and capacitors surrounding the IC set its frequencies according to the Bell 202 standard. The audio output from the IC is fed into an analogue switch. This analogue switch chooses audio input from either the XR2206 or optional microphone. This allows the operator to talk over the radio without having to unplug all of his modem connections to do it. The analogue switch is set to give the operator's microphone full priority over the TNC or contention circuitry discussed in the next paragraph. The output of the analogue switch is sent to the transmitter via the rig's microphone connection.

To insure that your radio does not clobber someone else's signal a means of telling the TNC if a signal is present is needed. The method used must conform to the RS232 standard since this is the chosen means of talking with the TNC. The method used here is to let the TNC monitor the RS232 DCD (Data Carrier Detect Line) since it is already part of the standard. The DCD line can be activated in one of two ways, either through the



detection of an audio carrier, (a signal provided by the XR2211) or by monitoring actual squelch level in the radio. Both methods have their advantages. Straight audio detection requires no modification of the radio, but is slow. Squelch detection is much faster but requires a connection to be brought out of the radio.

Once the TNC has ascertained that the channel is clear (through the DCD line), it will raise the Request To Send (RTS) line. The request to send is delayed long enough to allow the transmitter to be keyed and become stable, then Clear To Send (CTS) is sent back to the TNC. The TNC then proceeds to feed the packet to the modem.

An optional safeguard has been added to the modem. In the event that the system fails and the transmitter remains keyed, a timeout will occur via two monostables. (Two monostables are necessary to prevent a race condition.) The monostables will drop push to talk if the transmitter remains keyed for a period longer than the maximum length allowed for a packet. This feature is overridden when using the microphone.

If a more detailed description of the circuit is required, the reader is referred to the VADCG radio modem documentation, available with the completed modem or blank PC board.

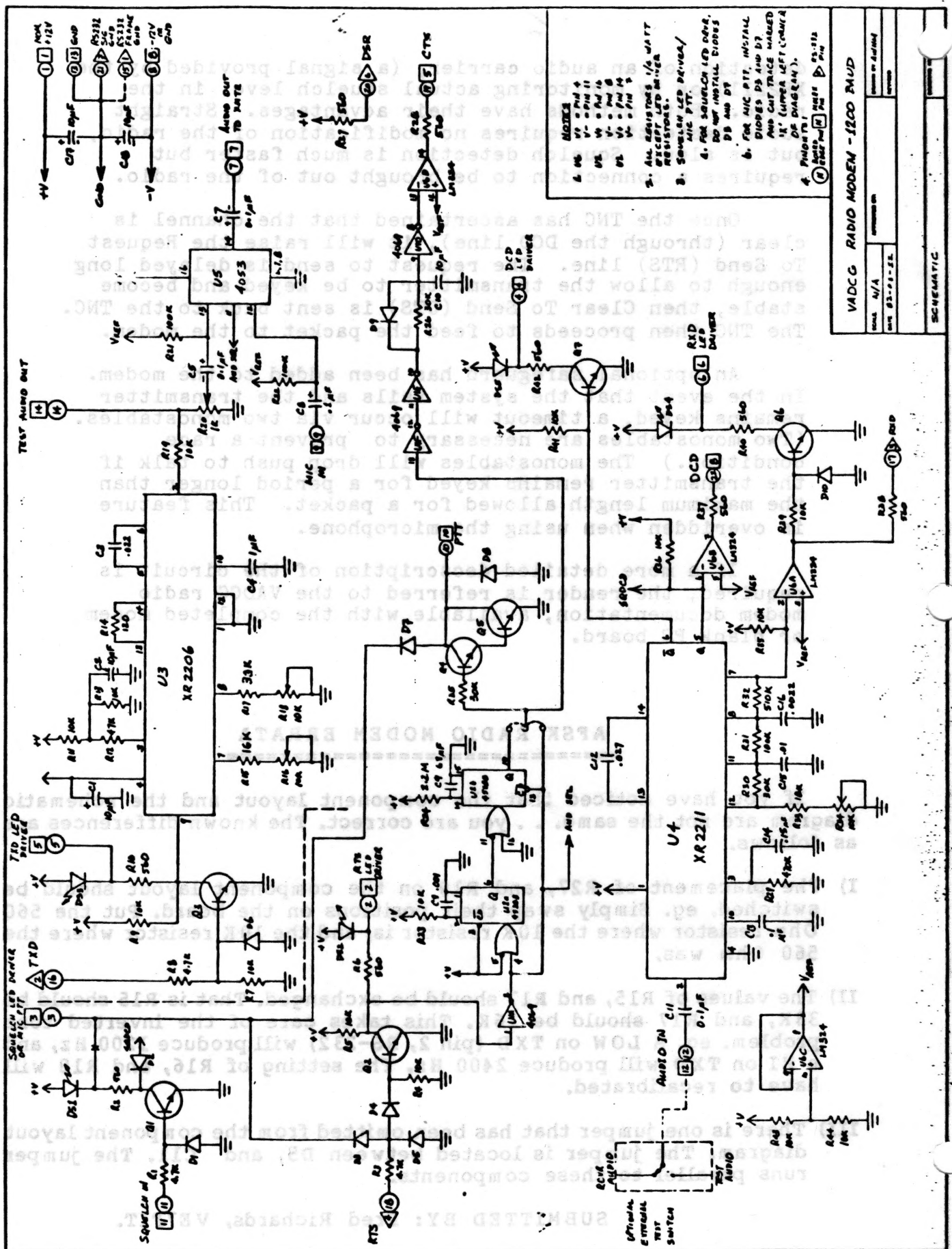
#### AFSK RADIO MODEM ERRATA

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If you have noticed that the component layout and the schematic diagram are not the same. . . you are correct. The known differences are as follows.

- I) The placement of R27, and R19 on the component layout should be switched. eg. Simply swap their positions on the board. Put the 560 Ohm resistor where the 10K resistor is, and the 10K resistor where the 560 Ohm was.
- II) The values of R15, and R17 should be exchanged. That is R15 should be 33K, and R17 should be 16K. This takes care of the inverted tone problem. eg. A LOW on TXD (pin 2, RS-232) will produce 1200 Hz, and a HI on TXD will produce 2400 Hz. The setting of R16, and R18 will have to be recalibrated.
- III) There is one jumper that has been omitted from the component layout diagram. The jumper is located between D5, and C11. The jumper runs parallel to these components.

SUBMITTED BY: Fred Richards, VE7FIT.



1200 BAUD VADCG RADIO MODEM

This unit is specifically designed to operate as an AFSK 1200 baud radio modem. It is meant to work over ordinary VHF or UHF FM voice channels. Bell 202 modem tones are used so that it becomes a small, low cost alternative to the older surplus boxes from the telephone system. Note that no provision is made for connection to a telephone line.

The connection to the terminal or computer uses RS-232 compatible levels such as those in the VADCG TNC. These levels become 1200 Hz mark and 2200 Hz space tones. No modification of the transceiver is necessary as the audio and control lines connect directly to the Mic, Earphone and PTT pins. User options include voice/data selection, prototype area, automatic transmit timeout in the event of controller malfunction and external squelch input.

The modem comes assembled or as a bare board with full assembly and test instructions and an explanation of operation.

To:

VADCG, 818 Rondeau St., Coquitlam, B.C., Canada, V3J 5Z3

Enclosed is:

Can. U.S.	
---- \$20	\$17 for TIPTT EPROMS only (give defaults)
---- 20	17 for LIPTT EPROMs only
---- 30	27 for all 4 programmed chips
---- 15	15 for diskette with TIP, LIP and other software
---- 32	30 for TNC board
---- 135	117 for RS232 parts kit
---- 15	15 for 8250
---- 50	44 for 8273
---- 15	15 for 202 radio modem card
---- 80	70 for modem card, assm.+ tested.
---- 15	15 for newsletter and membership ___new,___renewal.
---- 10	10 for newsletter only (>100km) ___new,___renewal.
Name _____	Call _____
Address _____	City _____
Prov/State _____	Postal/ZIP code _____
Phone _____	Computer or Terminal _____

(Please do NOT publish my name \_\_\_address\_\_\_phone no. \_\_\_)